HOW to

Grow and Maintain a Healthy Birch Tree

USDA United States Department of Agriculture | *Prepared by* Forest Service | Northeastern Area State & Private Forestry

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Cover Photo
Courtesy of Edward Gilman, Associate professor, University of Florida

This publication is targeted for the upper Midwestern states. However, much of the material discussed is relevant anywhere birch is grown as a landscape tree.

Introduction

Birch trees are prized for their outstanding bark characteristics and their graceful delicate foliage. Numerous species and cultivars are used in landscapes, and almost all are distinctive in bark coloration, growth form, and susceptibility to certain insect pests. Though homeowners often desire birch as an ornamental tree, they soon discover that birch can be very difficult to maintain as a healthy, long-lived specimen. In many landscapes, birch trees begin to decline within a few years, and many trees die well before reaching maturity. A healthy birch tree should be able to survive and thrive for 40-50 years. In many yards, however, it is not unusual for birch trees, especially the white-barked birches, to die well before reaching 20 years of age.

In many instances, homeowners have predisposed their birch trees to problems by planting and growing them under conditions that are not the best for their survival. Many of these problems can be avoided by following the four basic steps described in this pamphlet:

- Select an appropriate location for your birch tree.
- Select the most appropriate species or variety of birch.
- Follow cultural practices that will maintain a healthy birch tree.
- Monitor and control common insect pests of birch trees.

If you already have an established birch tree, the last two steps, proper cultural practices and insect control, can still be used to maintain your tree in a healthy condition.

Step 1 - Selecting the Proper Site

In the forest, birch trees thrive on cool, moist soils. Their very shallow root system makes them sensitive to even short periods of drought or heating of the soil, thus they grow poorly on hot, dry soils. Therefore, homeowners should attempt to place birch trees in locations where the soil will be shaded, cool, and moist. However, birch trees require full to partial sunshine on their leaves to grow well. **The challenge is to select a growing site where the soil will remain cool and moist, but where the tree will also receive full sunshine on its leaves for much of the day.**

Excellent locations for placement of birch trees in the landscape generally are found on the east and north sides of a home where the building provides afternoon shade (Figure 1). Avoid southern and western exposures where the afternoon sun heats and dries the soil. There are other tree species available that are well adapted to hot, dry locations. Remember that existing trees and structures can often provide the necessary shading. An excellent time to evaluate your landscape for a proper site would be mid to late afternoon. At that time, look for locations where the ground is shaded.

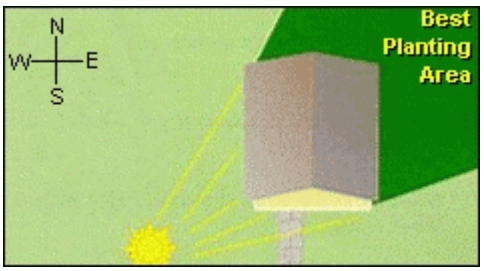

Figure 1. *Selecting the proper site. Avoid growing birch trees in hot, dry locations. Select a planting site that has shaded soil in the afternoon.*

After deciding that you have a planting area that meets the requirements for soil temperature and moisture, you still need to consider several other factors:

Overhead wires - A common mistake is planting young trees under overhead wires. Remember that most birch trees growing in yards can reach 40-50 feet in height.

Compacted soils - Avoid areas that are compacted or likely to become compacted, such as along trails or driveways. Remember, birch trees have a very shallow root system that can be easily damaged by soil disturbance. Compaction can be lessened by following some of the cultural practices discussed under Step 3, especially mulching.

Soil acidity - Birch trees do best on slightly acidic soils (pH 5.0 - 6.5), though the white-barked birches especially our native paper birch-are capable of growing well on alkaline soils. River birch often develops iron chlorosis (yellow foliage) in alkaline soils and should be avoided as a tree selection in most cases where the pH is greater than 6.5. Slightly alkaline soils can be made more acidic if you add soil amendments, though it can be difficult to maintain the soil pH over the life span of a tree (discuss this with your county extension agent). Soil tests can be obtained at many county extension offices and some nurseries.

Wet soils - Most birch trees prefer moist but not wet soils. If your planting location is in an area that is poorly drained or that may occasionally flood for short periods of time, you should limit your selection to river or Heritage river birch both of these can also be grown on drier soils).

Step 2 - Selecting the Right Birch Tree for Your Landscape

A number of different types of birch trees are available for landscape use. Most have some characteristics that are common, including these:

- Medium size, often reaching 40-50 feet in height
- Yellow leaves in the fall
- Available as single stemmed trees, but also as clumps having 3-5 stems.

The white-barked birch trees are more susceptible to attacks by bronze birch borer, a serious insect pest, than are the birch species without white bark (river birch, Heritage river birch, sweet birch, and yellow birch). Within the white-barked trees, our native species, paper birch and gray birch, show more resistance to bronze birch borer than do the many exotic species such as European white birch. Whitespire birch is one exotic white-barked birch tree that has been more resistant to bronze birch borer than the other exotic trees, thought it is still susceptible. In warmer climates, such as Ohio and Iowa, river birch or Heritage river birch is often a better tree selection than any of the white-barked trees. The white-barked trees are more likely to do well in cooler climates, though yellow birch, river birch, and Heritage river birch also do well in cooler areas. In far northern areas such as northern Minnesota (USDA Hardiness Zone 3), planting only native paper birch generally is advised. For further discussion see Table 1.

Once you have selected the proper site and birch tree, be sure to follow recommended planting procedures. Publications on proper planting are available through county extension offices.

Figure 2. *General bark characteristics of selected birch trees*.

Table 1 - Birch Tree Characteristics

This foldout table lists characteristics of birch trees that are of greatest interest in most landscapes. The birch trees listed include native species and some of the more commonly sold exotic species and varieties. Other birch varieties and species are available. Reliable information, especially on susceptibility to insects, is not available for all of the trees listed.

Common Names/ *Scientific Name*	Bark Characteristics	Susceptibility to Insect Pests	General Comments
Paper Birch **White Birch** **Canoe Birch** *Betula papyrifera*	On young trees the bark is brown; it turns white as the tree ages. The bark peels on older trees.	- Susceptible to birch leafminer - Moderately susceptible to bronze birch borer	- Native white-barked birch - A good selection in far northern climates (USDA Hardiness Zone 3), although it also does well further south (Ohio, Illinois) - Tolerates alkaline soils well
Gray Birch *Betula populifolia*	Chalky white non-peeling bark	- Susceptible to birch leafminer - Moderately susceptible to bronze birch borer	- Native to the northeastern United States
Jacquemonti Birch **Whitebarked Himalayan**	White bark that peels	- Susceptibility to birch leafminer is unknown - Highly susceptible to	- May be difficult to find in nurseries; more common in the eastern United States

Birch *Betula jacquemontii*		bronze birch borer	- Generally not recommended as a landscape tree because of its susceptibility to bronze birch borer
European White Birch **Silver Birch** *Betula pendula*	White non-peeling bark that turns black as it ages	- Susceptible to birch leafminer - Highly susceptible to bronze birch borer	- Very susceptible to insect problems; therefore, it is not recommended as a landscape tree
Young's Weeping Birch **European White Weeping Birch** *Betula pendula 'Youngii'*	White bark that peels	- Susceptible to birch leafminer - Highly susceptible to bronze birch borer	- Weeping habit; no central leader - A variety of European white birch
Whitespire Birch *Betula platyphylla japonica 'Whitespire'*	White non-peeling bark	- Susceptible to birch leafminer - Moderately susceptible to bronze birch borer	- Considered more heat tolerant than other white-barked birches; therefore, it is often recommended for planting further south than most other white-barked birch trees
Crimson Frost Birch *Betula platyphylla* var. *szechuanica x Betula pendula 'Purpurea'* 'Crimson Frost'	White bark with cinnamon tones that peels	- Insect susceptibility unknown	- Deep red leaves - Fall foliage varies from crimson to orange-yellow - Prefers moist soil; does well in heavy clay soil - A few other "red-leaf" birches are now available
River Birch **Red Birch** *Betula nigra*	Salmon-colored bark that peels and turns to dark red-brown plates as it ages	- Susceptible to birch leafminer, although attack is generally not severe - Resistant to bronze birch borer	- Native to the southern United States and along the Mississippi River as far north as St. Paul, MN - Can do well on wet soils although it also grows well on drier soils - Sensitive to alkaline soils with a pH greater than 6.5 - A good selection in southern climates (USDA Hardiness Zone 6) although it also does well in cooler climates (Hardiness Zones 4 and 5)
Heritage Birch **Heritage River Birch** *Betula nigra* 'Heritage'	Salmon-colored bark that peels; lighter in color than the native river birch	- Susceptible to birch leafminer, although attack is generally not severe - Resistant to bronze birch borer	- A variety of the native river birch - Can do well on wet soils although it also grows well on drier soils - Sensivitve to alkaline soils with a pH greater than 6.5 - A good selection in southern climates (USDA Hardiness Zone 6) although it also does well in cooler climates (Hardiness Zones 4 and 5)
Yellow Birch *Betula alleghaniensis*	Yellow-orange bark that peels and turns to reddish-brown as it ages	- Resistant to birch leafminer - Moderately susceptible to bronze birch borer	- Native to the Great Lakes region and the northeastern United States - Can be grown in more shade than the other birches - May be difficult to find available in nurseries - Not widely planted as an ornamental - Requires a cool, moist planting site
Sweet Birch **Black Birch** **Cherry Birch** *Betula lenta*	Brown to almost black; becomes platey as the tree ages	- Resistant to birch leafminer - Moderately susceptible to bronze birch borer	- Native to the northeastern United States - May be difficult to find available in nurseries - Not widely planted as an ornamental

Download landscape page of **Table 1 - Birch Tree Characteristics**

Step 3 - Maintaining Your Tree

Cultural practices (mulching, watering, fertilizing and pruning) play an important role in developing and maintaining healthy birch trees. **Mulching and proper watering are the most important.** These two practices can create the cool, moist soil conditions that birch trees need. The following information provides guidelines to help create optimum conditions for your tree.

Mulching - Aside from aesthetic benefits, mulching moderates soil temperatures (keeps soil cool during summer heat), conserves water in the soil, reduces competition from other plants, adds organic matter to the soil as it decomposes, and reduces soil compaction. Also, the decomposition process helps build new layers of soil with improved structure which aids in better water retention and oxygen exchange. Finally, placing mulch around the base of a tree reduces the likelihood of damaging the stem with a lawnmower or weed trimmer. All these benefits create a healthy environment for tree roots, and help promote tree growth and survival.

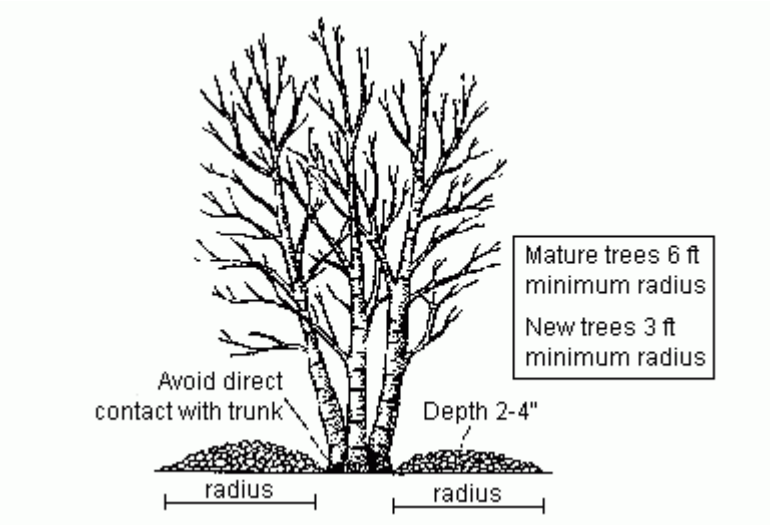

Figure 3. ***Proper depth and width of mulch*****.**

The best materials for mulching are wood chips, shredded bark, and leaf compost. Rock or stone mulch can also be used. While aiding in temperature moderation and water retention, rock or stone mulch will not add organic matter to the soil, nor will it reduce weed growth. In addition, reflective heat may be a problem with white marble chips, and crushed limestone may increase soil pH. Crushed or washed river stone is probably the best material if rock or stone mulch is your desired choice. **Do not place plastic under any of the mulches since it can retard water movement and oxygen diffusion into the soil**.

Watering - Sufficient water is probably the single most important factor in maintaining a healthy birch tree. If rainfall is insufficient, supplemental watering may become necessary. During the growing season a slow (2-3 hours), deep (8-18 inches) watering once per week is a general rule for maintaining adequate soil moisture. Infrequent, light waterings are not recommended. Laying a hose on the ground and allowing it to run slowly over the root zone is a very good technique for ensuring adequate watering. A soil that can be formed into a ball in your hand has sufficient moisture; loose, dry soil that crumbles in your hand indicates the need for additional watering. Watering should be decreased by late August to allow for proper winterization of a tree.

Fertilizing - Fertilization is beneficial only when nutrients are lacking. A soil test should be

completed to determine the need for corrective measures. If a tree is showing stress symptoms that are not the result of insufficient nutrients, fertilization will not correct the problem.

Reasons to fertilize are these:

- To correct a nutrient deficiency
- To accelerate growth when trying to establish a new planting quickly
- To maintain health (usually to replenish nitrogen).

The best time to fertilize trees in the northern United States is late fall or early spring. Do not apply fertilizers between mid-August and mid-September as that may force a late flush of growth that may not harden off before winter. Nutrients should be available to the tree during its peak growth period in the spring and early summer. Fertilizers should not be applied when the ground is frozen.

Important points:

- Fertilize only when a soil test indicates a nutrient shortage or imbalance.
- Make sure adequate water is available following the application of fertilizers.
- Fertilize in late fall or early spring. Avoid fertilizing between mid-August and mid-September.
- Use slow-release fertilizers.

Fertilization Methods

Type of Application		**Uses**
Surface (Broadcast)		Best used when turf is not present under a tree. Nitrogen and potassium should be the only elements added for a surface application.
Subsurface (Soil Injection)		Can be used with or without turf. This method often requires a professional applicator. Best used when phosphorus is required, when soils are compacted, or when runoff potential is great.
Fertilizer Spikes		Can be used with or without turf. Convenient and relatively easy to use. Spikes can be expensive, especially for large trees.

Pruning - Comments on pruning in this section are very general and should be read along with the discussion that follows on the bronze birch borer.

Excessive pruning (greater than 25 percent of the live canopy) should always be avoided. Heavy pruning increases light penetration to the root zone and can increase soil temperatures and reduce soil moisture levels. Pruning of birch trees should NOT be done between May 1 and August 1. This is the flight period of the bronze birch borer, and it has been shown that female birch borers are attracted to fresh pruning wounds. If pruning must be done during this time period, treat the wound with a registered insecticide. **Wound dressings should not be used since they are not effective at repelling borers and do not promote closing of wounds.**

Proper pruning techniques are important and should be followed when pruning trees. Please refer to the publication titled "How To Prune Trees" for detailed guidelines. See the back section on Suggested Reading for instructions on obtaining a copy of this publication.

Step 4 - Monitoring and Controlling Insect Problems

Landscape birch trees are often attacked by two common insect pests, birch leafminer and

bronze birch borer. Leafminer attacks do not kill trees; however, they can reduce the aesthetic appearance by turning the leaves brown (Figure 4). In addition, a heavy infestation can weaken a tree's ability to resist attack by the bronze birch borer.

The birch borer is a tree killer (Figure 5). It is a small beetle that thrives on weakened trees. The first symptom of birch borer attack is sparse, stunted foliage in the upper crown. This symptom progresses to twig dieback and then to branch dieback (Figure 6). The process of decline can take several years before a tree dies, though it can also occur very quickly during a single hot, dry year. The decline of a birch tree may be reversed in the early stages, but recovery is improbable after more than 50 percent of the crown is damaged.

Figure 4. *Early summer leaf browning caused by birch leafminer.*

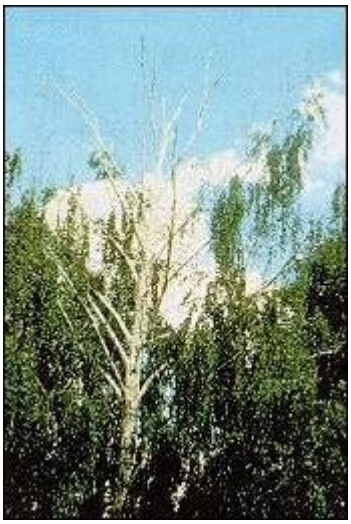

Figure 5. *A classic example of a tree infested with bronze birch borer.*

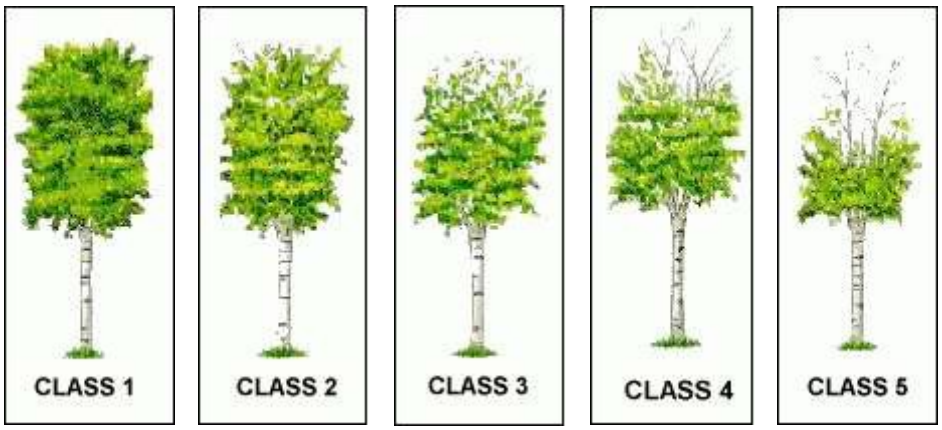

Figure 6. *Decline caused by the bronze birch borer. Class 1 trees are healthy. Class 2 trees are in the early stages of birch borer infestation. Class 3 and class 4 trees have more advanced stages of borer infestation. Trees in class 5 are very close to dying. Trees in classes 2 and 3 may be treated for birch borer with some success. Trees in classes 4 and 5 are generally beyond recovery. (Based on information from J. Ball, South Dakota State University).*

Controlling Birch Leafminer

Leafminers on birch can be controlled by using a registered insecticide to maintain aesthetic appearance and to prevent trees from undergoing periods of stress caused by excessive leaf loss. A list of insecticides should be available through your county extension office.

Insecticides for controlling leafminers are often applied in three ways: (1) a foliar spray, (2) a

soil application, or (3) by painting an insecticide on the stem or bole of the tree. The foliar spray and soil applications are generally the most reliable methods. At this time, there is no supporting evidence that shows bole painting to be a reliable method of control.

Foliar Spray - A thorough application is necessary within 2-5 days after the first tiny yellow spots appear on the leaves, following egg laying (Figures 7 and 8). **Generally, the spots show up within a week or two of when the leaves first emerge.** The spray should be applied before the spots expand to larger (dime to nickel size) brown blotches. At that point, it is too late to reduce the damage, and insecticides should no longer be used. Instead, attempt to maintain tree health by mulching and watering (see the discussion on Maintaining Your Tree).

The first treatment, in the very early spring, is the most critical. Additional sprays may be needed for later generations of leafminers; however, these later attacks generally involve much lower numbers of insects and in most cases do not require control.

Figure 7. *Spots that form on leaves following egg laying by leafminers. When these spots appear, it is a good time to spray a foliar insecticide.*

Figure 8. *Advanced leafminer damage. This is about the last point at which foliar insecticides can be successfully used.*

Soil Application - Some insecticides can be applied to the soil where they are absorbed by the roots and transported to the leaves. These systemic insecticides can work very well. The key to being successful with a soil application is applying the material very early in spring, before bud break. Later applications will not have time to be absorbed by the roots and transported into the developing leaves. In most cases, soil applications are best done by a professional tree care company.

Bole Painting - Some systemic insecticides can be applied directly to trees by brushing or painting the material onto the bole (trunk) of the tree in a band just below the lower branches. The insecticide is absorbed through the bark and transported into the leaves. The best time to apply this material would be just as leaf expansion begins in the spring. The technique is a very easy one for the homeowner; however, its success rate is not well documented.

Controlling Bronze Birch Borer

Following Steps 1-3 in this leaflet are the best course of action for preventing birch borer problems: (1) do not plant a birch tree if the site is not suitable for birch, (2) select a birch species or variety that is less susceptible to birch borer, and (3) maintain tree health through cultural practices. If your tree becomes infested with birch borer, you should first evaluate the extent of the infestation (Figure 6). If the tree is in either class 2 or 3, follow the treatments listed below. In most cases, both treatments will be necessary for a tree to fully recover. If the tree is in class 4 or 5, it will be very difficult to save and should be removed.

Treatment 1: Begin a regular schedule of deep, heavy watering as described under Step 3 in this leaflet.

Treatment 2: Insecticides can be applied to the bark of trees to prevent new attacks. Thorough coverage of branches and the main stem is required. This treatment will not kill insects already under the bark. However, it will help prevent new attacks. Therefore, insecticide applications for birch borer should be targeted only at birch trees in classes 2 and 3. Depending upon the insecticide, as many as three applications are generally required during the spring and summer months (mid-May, mid-June and mid-July). Local county extension agents should be able to provide more site-specific treatment dates.

Pruning out the dead branches may improve the appearance of a declining tree, but it is unlikely to aid in recovery from a birch borer infestation. Birch borer attacks are not limited to the dead and dying branches. Therefore, in most cases their removal will not reduce the number of borers already in the tree. If pruning is done, it should be restricted to fall and winter, as spring and summer pruning can attract adult borers.

Suggested Reading:

Bedker, P.J.; O'Brien, J.G.; Mielke, M.E. 1995. **How to Prune Trees,** NA-FR-01-95. Radnor, PA: USDA Forest Service, Northeastern Area State and Private Forestry. 30 pp.
Available from: USDA Forest Service, 1992 Folwell Avenue, St. Paul, MN, 55108; or on the Internet via FTP or the World Wide Web at http://willow.ncfes.umn.edu

Most State Extension Services have publications available that discuss in detail tree planting, tree fertilization, and insect and disease management of shade trees. These publications should be available through county extension offices at a nominal cost.

Photo Credits

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Pesticide Precautionary Statement:
Pesticides used improperly can be injurious to humans, animals, and plants. Follow label directions and heed all precautions on the labels. Store all pesticides in original containers, out of reach of children and foodstuffs. Apply pesticides selectively and carefully. Do not apply a pesticide when there is danger of drift to other areas. After handling a pesticide, do not eat, drink, or smoke until you have washed. Dispose of empty pesticide containers properly. It is difficult to remove all traces of a herbicide (weed killer) from equipment. Therefore, to prevent injury to desirable plants do not use the same equipment for insecticides that you use for herbicides.

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